DOCUMENT RESUME

ED 392 649 SE 058 056

AUTHOR Lawrence, Allan; Parkin, Christopher
TITLE Environmental Education throughout FE. 2: A Model and Unit of Environmental Learning Outcomes. FEDA Paper.
INSTITUTION Further Education Development Agency, London (England).
REPORT NO ISSN-1361-9977
PUB DATE [95]
NOTE 32p.; For part 1, see SE 057 951.
AVAILABLE FROM Further Education Development Agency, Citadel Place, Tinworth Street, London, SE11 5EH, England, United Kingdom (6.50 British pounds).
PUB TYPE Reports - Descriptive (141)
JOURNAL CIT FE Matters; v1 n2 1995

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Adult Education; *Conservation (Environment); *Environmental Education; Evaluation; Foreign Countries; Science Activities
IDENTIFIERS England; Further Education Unit (England)

ABSTRACT

This report summarizes the outcomes of the "Colleges Going Green" project that sought to develop a widely applicable core of environmental learning outcomes (curriculum objectives) and illustrative learning assignments and to review activity in colleges and provide guidance on introducing environmental policy. This report also presents a unit of generic environmental learning outcomes specified at Level 2 and Level 3 (in the Further Education Development Agency (FEDA) and national qualifications frameworks) and illustrates how these can be implemented through learning assignments in various vocational areas together with assessment criteria enabling student achievement to be assessed. The units can be implemented free standing or the outcomes can be wholly or partly integrated into a vocational or other program. (JRH)

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ED 392 649

Environmental education throughout FE

2: A model and unit of environmental learning outcomes

FE MATTERS

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'Each institution's policy for environmental education should include, in particular, a strategy for the promotion of environmental education across the curriculum, together with an action plan for its implementation.

'FHE has an important part to play in developing the environmental understanding of students whose courses are not specifically "environmental" in focus.

'Such "cross-curricular greening" may be concerned with work-related needs, or more broadly with the students' needs as citizens. In practice, much provision may address both sets of needs concurrently.

'The development of a common level of environmental understanding across the whole institution's student body is a difficult objective to achieve in the short term, but experiments towards this end should be encouraged...

'The Further Education Unit's project, Environmental Education throughout FE, could shed some very useful light on the issues described above...'

Extract from *Environmental Responsibility. An agenda for further and higher education*, DFE/Welsh Office, 1993.

FEDA Further Education Development Agency

Environmental education throughout FE

2: A model and unit of environmental learning outcomes

Allan Lawrence and Christopher Parkin

FE MATTERS

FEDA paper

FEDA would like gratefully to acknowledge the contribution of Allan Lawrence, Senior Lecturer, Hopwood Hall College.

Thanks also to the colleges which took part in the development and trial of these outcomes, particularly: Accrington and Rossendale College, Basford Hall College (Maria Rice), Bromley College of Further and Higher Education (John Burton), Capel Manor College (Stewart Anthony), Coventry Technical College (Tony Chamberlain), Dunstable College (Keith Higham), St Helens College (David Wheatley), Walsall College of Arts and Technology (Nick Sakwa, Christine Bate).

Thanks also to Hopwood Hall College for permission to reproduce the cover photograph

Registered charity number: 1044145

ISSN: 1361-9977

Price: £6.50

Cover design by Mike Pope

Printed by Geerings of Ashford, Kent

This document has been printed on chlorine-free paper.

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Executive summary

- An approach to environmental education in FE should enable students to link their learning and achievement with their vocational interests and aspirations.
- The environmentally responsible person will have achieved the accompanying core skills necessary for them to use their environmental understanding and competences.
- A set of five general learning outcomes have been chosen, which emphasise the importance of natural processes and resources, the impact of human activity on the environment, the legislative framework and the economic and social benefits of good practice.
- The general and related specific learning outcomes are sufficiently generic to apply throughout all FE curricula (at Levels 2 and 3). The assessment criteria may vary according to the context and content of the area of learning and achievement.
- At Level 2, students should be able to describe and identify key issues and good practice. At Level 3 they should be able to understand, analyse and evaluate in such key issues and good practice.
- Illustrations of the application of the model are given in the following areas: Business & Finance, Carpentry & Joinery, Fashion & Textiles, Leisure & Tourism, Hotel & Catering, Waste Management.
- Teachers involved in this development have found this approach useful and successful. Continuing development work, application and evaluation are now required.

Introduction

In 1992, FEDA's predecessor, FEU, published a guide to environmental action in FE colleges — *Colleges Going Green*. In a list of key points, *Colleges Going Green* drew attention to the moral principle of sustainability; this includes a duty of care for other people and forms of life, and acknowledges the need to limit and to share the use of the earth's resources. While recognising the need for the integration of appropriate environmental elements across the curriculum (curriculum greening), much of the guidance in *Colleges Going Green* relates to good housekeeping.

This is the second of two reports updating *Colleges Going Green*. It does not repeat the advice given previously which remains relevant but aims to stimulate further curriculum development. While some colleges are implementing environmental policy statements and attending to the environmental dimension in many (if not all) curricula, there is still much to be done to meet the recommendations of Department for Education's expert committee report *Environmental Responsibility: An agenda for further and higher education* (1993).

Environmental Education Throughout FE 1 reports relevant national policy developments and initiatives and identifies approaches to developing the environmental dimension to the curriculum; these correspond to the different levels of commitment to environmental responsibility. It also illustrates methods of introducing environmental education from examples sent by colleges and gives indicators for evaluating institutional and curriculum practice.

The original project sought to develop a widely applicable core of environmental learning outcomes (curriculum objectives) and illustrative learning assignments and to review activity in colleges and provide guidance on introducing environmental policy.

This report summarises the outcomes of that work. It presents a unit of (generic) environmental learning outcomes specified at Level 2 and at Level 3 (in the FEDA and national qualifications frameworks). It illustrates how these can be implemented through learning assignments in various vocational areas, together with assessment criteria enabling student achievement to be assessed. This is not a unit validated or accredited by a national awarding or qualifications body, but a resource to be drawn upon.

The units can be implemented free standing or the outcomes can be wholly or partly integrated into a vocational or other programme. They also provide a starting point for developing the vision-oriented curriculum necessary for total environmental responsibility and sustainable development (see *Environmental Education Throughout Further Education 1.*). Adopting such a unit of learning outcomes could enable environmental education to be achieved for all students throughout an institution.

The units, outcome statements and illustrative assignments were developed by a group of experienced teachers in the FE sector. They discussed the aims of environmental education as identified nationally and internationally (see *Colleges Going Green*) and were influenced by the work of Allan Lawrence of Hopwood Hall College which also involved collaboration with colleges in Germany (the Rochdale and Bielefeld project, with funding from the European Social Fund).

This is a model which many teachers find attractive especially in relation to integrating environmental education and learning outcomes into vocational provision. It is consistent with the general learning outcomes for environmental responsibility developed since this work began in a project by the Council for Environmental Education (see *Environmental Education Throughout FE 1*).

The FE sector's task continues to be to develop in all students the ability to recognise the implications of their personal and work-related choices and decisions, and a commitment to sustainability.

Feedback on the issues raised here would be welcome. Please let us know of your progress in implementing environmental policies.

Christopher Parkin
FEDA Development Officer

1. Developing a core of environmental learning outcomes

Background

In deriving the core of environmental learning outcomes, account was taken of the need to build on the students' awareness and previous learning as part of the school curriculum or elsewhere. Most, if not all, students at 16 have a considerable awareness and interest in the environment. Many have some understanding of ecological relationships and awareness of aspects of the economic, social, technological and political processes affecting the environment. Most students will have tackled environmental topics before. It is important that students have the opportunity to link their environmental education with their vocational or potential vocational interests. Environmentally responsible citizens understand how their work practices affect the environment and how they can minimise these to ensure environmental protection.

Environmental responsibility involves the adaptation of basic patterns of behaviours by all individuals (*Towards Environmental Competence in Scotland*, 1991). Such behaviour will include actions ranging from simply turning off lights, machinery and equipment when not needed, to recycling materials, and to more complex activities, such as the inclusion of environmental considerations in design and planning. The widespread adoption of environmental responsibility will help to integrate good environmental practices throughout industry and commerce as a matter of course rather than as an afterthought.

Environmental Education in Further Education 1991-92 (HMI, 1992) states that most students taking vocational courses in FE receive a limited amount of environmental education. It also comments that the most effective learning takes place when an interdisciplinary approach is taken to the analysis, understanding and solution of environmental problems, when topics are relevant to the course objectives, and there is a good blend of theoretical and practical study. It is important to develop a strategy with a unified approach so that students will acquire skills to enable them to make informed choices and decisions. It is important that environmental education is linked to the employment aspirations of students, and that colleges develop their relationships with local industry in a context which seeks to sustain the environment.

The LUKAS Project in Northrhine Westphalia identified the following themes central to the development of environmental education in vocational education:

- the development and promotion of environmentally aware behaviour is an integrated process which has to appeal to the learner's entire personality
- environmental education has to be integrated with all subjects
- environmental education requires an action-based approach to overcome the discrepancy between knowledge and behaviour
- environmental education limited to individual responsibility is likely to be ineffective

The model in this document addresses these issues. It is skill and competence oriented which means that wherever possible students learn by approaching and addressing problems. Solutions can, and often do, result in the need to change vocational practice. While closely related to the vocational world and identity of the student, this model also presents a challenge for the incorporation of the outcomes in courses of general education.

Environmental education and core skills

Environmental education which is lasting and retains temporal validity must ensure that students have the skills to continually receive and evaluate the changing knowledge and disparate points of view that originate from different special interest groups and political and economic institutions.

Professional and/or vocational environmental literacy has been described as:

> *'knowledge and understanding of the way chosen subjects and vocations connect with the environment whether this be the natural environment or the environments of agriculture, towns and cities made by people.*
>
> (S. Richardson, 1991)

Environmentally responsible individuals possess 'skills, attitudes and values which enable them to take control of, and responsibility for their own lives, to work together to bring about constructive and positive change' (*Greening the Curriculum*, Shirley Ali Khan), and to 'evaluate and address the environmental problems associated with their work and life style'. These skills include the national core skills identified as necessary for post-16 education and previously anticipated in BTEC's Common Skills. It is interesting and not surprising that most of examples of the trial of the model of environmental outcomes has involved BTEC courses.

In developing the model and unit of learning outcomes, account has also been taken of the profile proposed for the 'active citizen' (Oxford Development Education Unit, 1989) and of the key dimensions of a vocational environmental education course developed by the ROBI Project. These include management of resources, energy use, pollution, legislation, health and safety, and people.

A note on learning outcomes and assessment criteria

Learning outcomes are statements of what a student should know, understand and be able to do. There is no unique way of presenting them, but three categories of outcome statements have been found useful according to how specific they are: general learning outcomes, (more specific) learning outcomes, and assessment criteria, which correspond for example to the usage of the terms Unit Title, Element, and Performance Criteria in GNVQ and NVQ Units.

2. The units: environmental education for sustainability

The learning outcome statements

This model of environmental education includes dimensions of education for sustainability.

> *Education for sustainability develops the awareness, competences, attitudes and values which enable people to be effective agents of sustainable development on a local, national, and international level and work towards a more equitable and environmentally sustainable future.*
>
> (Stephen Sterling, 1992)

A holistic view of the environment is essential. The approach is to engage the students' participation and experience. The curriculum model is made up of five general learning outcomes together with the associated more specific learning outcomes and supporting range statements.

These have been tested at qualification and credit framework Level 3 (Table 1) and Level 2 (Table 2). While the outcome statements at Level 3 and Level 2 are similar, they differ significantly in the demands upon the learner, through the choice of verb and content. These statements are a guide for curriculum and qualification developers and teachers developing assignments; they do not constitute an approved or validated national unit.

Range statements can be useful for specifying the knowledge and understanding which accompanies the learning outcomes. Such generic statements are added to Tables 1 and 2. These can be adapted to give particular relevance to a specific vocational programme or context.

Assessment criteria have also been written which indicate more precisely how achievement of the outcomes will be evident (see Chapter 3).

However, whereas the statements of general and specific learning outcomes are sufficiently generic to be applicable to a wide range of vocational programmes and contexts, assessment criteria vary according to the programme area and context. Examples are given in this document.

The five general learning outcomes include the dimensions of education for sustainability as outlined by Ewan McLeish (previously Director, Council for Environmental Education):

- a spatial dimension which includes people individually and collectively
- a temporal dimension which places the environment in a time continuum considering the effects of past decisions on the present, and the decisions and actions of the present on the future
- a conceptual dimension which is inter-disciplinary and draws from ecological, technological, economic, political and social education

The unit of collected learning outcomes has been called **Environmental Education for Sustainability (Environmental Protection)**. Such a title suggests that the model is relevant to the vocation as well as the actions of the individual. The model proposes a dynamic relationship: as a result of developing these skills and competences, the student will be proactive and make a positive contribution to reversing the planet's continuing degradation. It is ineffective to rely on individual action alone — there is often a discrepancy between the individual's environmental awareness and environmentally compatible behaviour.

Each of the learning outcomes should result in an observable and measurable change in personal or vocational practice.

Table 1. Environmental education for sustainability (environmental protection) general and specific learning outcomes Level 3

General learning outcomes (Level 3)	Specific learning outcomes
The student should be able to:	
1 Understand the importance of natural processes, relationships and resources that exist in the environment	Explain the importance of the cycles of matter and energy supply Explain the need for management of finite resources Relate the above to global consumption, population dynamics and industrial and social processes Be aware of the interdependence of actions by individuals and communities and the environmental consequences and opportunities of these relationships
2 Evaluate the environmental impact of an activity	Evaluate the impact of action in terms of environmental, economic, social and aesthetic dimensions Select options and justify good environmental practice Evaluate potential changes in vocational, personal, and national behaviour
3 Analyse how past decisions and activities affect a local environment	Explain the ways in which past activities and decisions have shaped the environment of the present day Evaluate relevant historical perspectives and events Identify the conflicts that arise from environmental issues and consider ways to resolve such conflicts
4 Interpret the legislative framework which exists to protect the environment	Apply the principles of the relevant environmental legislation Work (or identify good practice) within the principles of the relevant legislation e.g. EPA, HSAWA, COSHH
5 Evaluate economic and social benefits of good environmental practice	Relate the concept of sustainability to local, national and global environmental issues Evaluate conservation, re-use and recycling in an economic and social context

Range

1 Basic ecological terminology — ecosystem, habitat, community, resource
Natural processes and systems — cycles of matter, energy sources and transmission of energy in the ecosystem
Energy and raw material sources — finite and renewable with pollution effects
Patterns of population of developed and developing nations and global trends
Social and industrial pressures on the global ecosystem within a context of unsustainable growth

2 Cause and effect — use of resources, production of waste and pollution linked to industrial processes and consumer behaviour
Waste and resource management
Water pollution and conservation, energy use and the relationship with serious pollution. Link with input:output statements for a given process
Relevant industrial and social processes

3 Similarities and differences between people and their use/perception of the environment
Population and social change. Environmental awareness and use of land and resources as a component of cultural and social needs
Inter-relationships and conflicts between society and the environment

4 Legislation; environmental Protection Act (1990), Control of Substances Hazardous to Health Act (1989), Health and Safety at Work Act (1974), The Water Act (1991)
Vocational, craft or industrial processes

5 Sustainability as a necessity for future global development
Conservation from an environmental, economic, aesthetic and moral perspectives

Table 2. Environmental education for sustainability (environmental protection) general and specific learning outcomes Level 2

General learning outcomes level 2	Specific learning outcomes
The student should be able to:	
1 State the importance of natural processes, relationships and resources that exist in the environment	Describe the importance of the cycles of matter and energy supply Describe the finite nature of resources and the consequent need for management Relate the above to issues of personal, national and global consumption
2 List the environmental effects of an activity	Describe how industrial and social processes may have an impact on the environment Suggest a sustainable alternative with the technology available Propose changes in behaviour as a result of the suggested solution
3 Describe how past decisions and activities affect a local environment	Identify the ways in which past activities and decisions have shaped the environment of the present day State relevant historical perspectives and events
4 Describe the legislative framework which exists to protect the environment	List the basic principles of the relevant legislation, e.g. EPA, COSHH, etc. Work within the relevant legislation.
5 Identify economic and social benefits of good environmental practice	State examples of local and personal activities which benefit the national and global environment Describe examples of conservation, re-use and recycling

Range

1 Basic ecological terminology — ecosystem, habitat, community, resource
Natural processes and systems — cycles of matter, energy source and transmission of energy within the ecosystem
Energy and raw material sources — finite and renewable with pollution effects. Identification of sustainable practices

2 Cause and effect — use of resources, production of waste and pollution linked to industrial processes and consumer behaviour
Waste and resource management
Water pollution and conservation, energy use and the relationship with serious pollution
A relevant industrial or social process

3 Similarities and differences between peoples and their use/perception of the environment
Population and social change. Use of land and resources as a result of cultural and social needs

4 Legislation; EPA, COSHH, HSAWA, The Water Act, The Countryside Act — as appropriate
Vocational, craft or industrial processes

5 Sustainability as a necessity for global development

The general learning outcomes

The rationale for the chosen five general learning outcomes at Level 3 (Advanced) is as follows:

1 Understand the importance of natural processes, relationships and resources that exist in the environment

This general learning outcome requires an understanding of the natural processes that take place in the environment and an awareness of the interdependence of all species, individuals, communities and nations. These include relationships between the human population and resources. Performance that exhibits an understanding of these issues includes the effective management of resources or materials and the prevention of waste and/or recycling of any finished or discarded material. This can be illustrated in a range of activities relevant to the student's vocation.

It is necessary to emphasise the importance of the relationships rather than simply the relationships themselves; to describe the Carbon and Nitrogen cycles shows no understanding. Processes in the natural world are connected and it is the activities of human societies, predominantly those of the industrialised, wealthier nations, which threaten these relationships and balances. This learning outcome could also be achieved by an evident awareness of the relationship between energy resources, raw materials and demand, and the ultimate impact of that demand if it is uncontrolled. Similarly, by-products or waste produced by any process cause damage when they enter these natural systems. The awareness that nothing in the environment remains static and unmoving is very important in understanding the problems of pollution and one's own responsibilities as a consumer of these resources.

2 Evaluate the environmental impact of an activity

If the individual understands the cyclic and dynamic relationships in the biosphere, human lifestyles, industrial processes and other activities can then be seen in terms of their impact on the environment. This may be one of pollution, but also includes aesthetic, social, health and economic dimensions. Students should be encouraged to carry out a simple life-cycle analysis or environmental audit and review of a related vocational activity or place of work to see the implication of their activities on the environment. Such an activity should also enable the students to a least evaluate, or to arrive at, solutions and identify costs in changing to more environmentally responsible practice.

Environmental audit or review is in many ways central to the underpinning philosophy of this environmental curriculum model. The review process does not have to be complex, but many of the environmental problems that face us today are the result of our ignorance of the processes of production and their effect on the environment. To achieve the aim of environmental protection requires an understanding of the processes that create goods and services and to acknowledge our integral role in these processes as an employee and a consumer. If environmental management strategies are to become an essential component of companies' practices as they approach the next century, then it is imperative that the student is made familiar with their function.

This learning outcome requires the student to evaluate the different stages of the production process in terms of environmental, social, health and economic criteria. In turn, these raise awareness of the numerous trade-offs that have to be assessed in the work environment and which leads to what is termed the 'best practicable environmental option'.

3 Analyse how past decisions and activities affect a local environment

The environment has always changed in response to actions and decisions, but it is also important to appreciate how there may be a long-term consequence of decisions and actions of the present, to which we may make a contribution. An important dimension is to acknowledge how local actions may result in global effects.

Student performance should include the identification of features of the environment that have resulted from past actions, and other historical perspectives that relate to the local environment, e.g. social, political, industrial and cultural components.

4 Interpret the legislative framework which exists to protect the environment

Although the first form of environmental legislation probably related to environmental and public health and personal safety while at work, the Control of Substances Hazardous to Health Act (COSHH, 1989) and the Environmental Protection Act (1991) have resulted in a legislative framework which has implications for nearly all vocational areas. Understanding of this should include the concepts behind the acronyms, e.g. the Polluter Pays Principle (PPP), Integrated Pollution Control (IPC), Best Practicable Environmental Option (BPEO) and Best Available Techniques Not Exceeding Excessive Cost (BATNEEC). Other legislative acts such as the Water Act (1990), Food Safety Act (1991), the Control of Pollution (Special Waste) Act (1980), and the Countryside Acts may all have implications for some vocational areas. Obviously, assessment criteria should include complying with legislation. The role of the European Union is crucial and the effect of its directives in the development of environmental legislation should be included.

5 Identify economic and social benefits of good environmental practice

Students should be able to identify good environmental practice and sustainable development while also identifying social and economic advantages. They should be aware that the cost of environmental damage is not included in the price that we pay for our goods. If there is no price to pay for damaging the environment, it is therefore difficult to save money or be 'economic' by protecting it. All individuals must have an understanding of sustainability and therefore suggest solutions to environmental problems and environmentally damaging practices. Often this may require an understanding of different cultures and viewpoints.

Clear assessment criteria for this outcome would be the demonstration of an integrated and co-operative approach to solving environmental problems, and seeking information from a wide range of sources.

3. Application of the model

The development of learning outcomes in vocational areas

For many lecturers in subjects not usually considered in relation to the environment, embedding environmental learning outcomes may seem onerous and adding an environmental education unit the easiest solution. This, however, has cost implications and may also mean minimal impact on the need to consider environmental issues as an integral part of vocational practice.

This is a staff development issue: the environmental specialist may be able to raise the environmental awareness of the vocational course team so that the relevant outcomes can be embedded in the framework of the vocational course. The disadvantage of a separate unit is its 'separateness'. However, there is a case for both approaches: integrating environmental learning outcomes into the programme and adding environmental modules with more specialist input. Obviously this has to be realised in a context where time for a course is being rationalised and time for other vocational units has been reduced.

The inclusion of assessment criteria

The general and specific learning outcomes remain similar whatever the vocational area but the assessment criteria which qualify the outcomes are likely to vary according to the application, to reflect the content and context adequately. This has been found the most satisfactory approach.

For example, 'Evaluate the environmental impact of an activity' may involve assessing the environmental impact of either the manufacture of a particular fabric or garment in a Fashion & Textiles course, or a meal or a recipe as part of a Hotel & Catering course.

Examples of assignments and assessment criteria in vocational areas

This chapter includes examples which are relevant to particular vocational programme areas (and students' interests) plus assessment criteria corresponding to the learning outcomes.

Examples 1-5 illustrate assessment criteria corresponding to each of the general learning outcomes (1 to 5) and an assignment in a particular vocational programme. Example 6 illustrates an assignment designed to enable achievement of several general and specific outcomes.

Example	General learning outcome	Student programme	Level	Assignment
1	1	Nursery nursing	3	Trees in the environment
2	2	Fashion & textiles	3	Textile finishing processes & water pollution
3	3	Business & finance	3	Road building policy
4	4	Waste management	3	Waste Disposal
5	5	Hotel & Catering	3	Green Cuisine Day
6	1, 2, 5	Carpentry & Joinery	2	Casement Windows

While these assignments are designed in relation to the stated vocational areas, they may have wider applicability.

Example 1

General learning outcome 1 — **Understand the importance of processes, relationships and resources that exist in the environment**

Student programme: Nursery Nursing Level 3,
Basford Hall College
Learning assignment: Trees in the Environment

This assignment is designed to enable the nursery nurse to help teachers to develop children's awareness of the environment and to support the National Curriculum at Key Stage 1. It gives students an opportunity to develop a commitment to a longitudinal study of a micro-habitat. Students choose two trees, identify their features and observe the trees on three occasions throughout the seasons. The function and uses of trees in the management and conservation of the natural environment are examined, and a variety of conservation methods and trends are discussed.

The best time to begin this assignment is in autumn or early summer. The longitudinal study is designed to enable students not only be aware of seasonal changes, but also to see the environmental issues as relevant to their immediate surroundings.

Students report that this assignment helps then to put environmental issues into perspective. Following the assignment, some have joined local conservation groups.

Specific learning outcomes	Assessment criteria
1.1 Explain the importance of the cycles of matter and energy supply	State cycles of matter (carbon, water) and food chains Explain the place occupied by trees in natural cycles and food chains
1.2 Explain the need for management of finite resources	Relate functions of trees to the interdependent environment Identify the use of trees as a resource which needs to be managed to maintain function; e.g. explain management of rain forests, ancient woods, plantations and protection of individual trees
1.3 Relate the above to issues of global consumption, population dynamics and industrial and social processes	Describe uses of wood in industry, road building and agriculture Relate the uses of trees for private needs and industrial processes, e.g. discuss pressures for removal and replanting
1.4 Be aware of the interdependence of actions by individuals, communities and nations and the environmental consequences and opportunities of these relationships	Identify and evaluate policies and pressures upon different communities, (social cost of short-term policies) Discuss objectively different political, social and economic systems which influence the use and management of trees

Example 2

General learning outcome 2 **Evaluate the environmental effect of an activity**

Student Programme: Fashion & Textiles Level 3,
Hopwood Hall College
Learning assignment: Textile Finishing Processes and Water Pollution

This assignment has been developed for Fashion & Textile students (Level 3) who are often unfamiliar with the scientific approach to collecting data, analysis and drawing conclusions. Students examine in group work the chemical content of waste produced by the textile room of the college. They carry out tests on textile effluent samples arising from dyeing and printing, cleaning printing screens and tables, and soaked loom state cotton. Students draw conclusions on sources of contaminants and their environmental and health effects, and consulting COSHH technical data sheets, consider how material change can lead to a reduction in pollution. The assignment has led to a reduction in formaldehyde and chromium in the effluent by changing suppliers of certain materials.

This assignment is also designed to develop the scientific and deductive skills required in the environmental control of water and trade effluents. Students describe the assignment as 'eye opening'.

Specific learning outcomes	Assessment criteria
2.1 Evaluate the impact of action in terms of environmental, economic, social and aesthetic dimensions	Describe the effect of dyes, bleaches and other finishing processes Identify correctly the harmful pollutants in an effluent
2.2 Select options and justify sustainable environmental practice	Relate textile finishing processes to environmental effects Suggest alternatives to reduce pollution and environmental impact
2.3 Evaluate potential changes in vocational, personal and national behaviour	Identify the need for textile finishing related to consumer demand and relate to pressures on the environment Suggest changes to textile finishing practices

Example 3

General learning outcome 3 — **Analyse how past decisions and activities impact on a local environment**

Student programme: Business & Finance Level 3,
Hopwood Hall College
Learning assignment: Road Building Policy

This is an assignment based on newspaper articles (e.g. *Guardian*, 5 February 1993) which itemise plans for new motorway construction. Students of Business & Finance (Level 3) carry out an environmental impact assessment and identify sustainable practice. Students work in groups of two or three to argue the case for or against one road building programme. They are required to consult local authority, Department of Transport and other sources concerned with transport and the environment.

Students identify on a map important environmental features threatened by development, criteria on which judgements should be based, and problems which the development seeks to alleviate. They produce a report (maximum 1,000 words) which explains concisely the economic, environmental and social and health arguments for and against the proposed route. This report summarises the case which is presented in a debating forum.

Specific learning outcomes	Assessment criteria
3.1 Explain the ways in which past activities and decisions have shaped the environment of the present day	State existing traffic flow problems and their effect on the environment and the community
3.2 Evaluate relevant historical perspectives and events relevant to the local environment	Identify how transport policy can alleviate existing conflicts Describe present day transport policy and the factors which influence decision
3.3 Identify the conflicts that arise from environmental issues and consider ways to resolve such conflicts	Explain purpose of road building strategy and role of government policy in protecting and threatening the environment Evaluate consequences of a planning proposal for the local community

Example 4

General learning outcome 4

Interpret the legislative framework which exists to protect the environment

Student programme: Waste Management Level 3,
Coventry Technical College
Learning assignment: Waste Disposal

In this assignment, students of Waste Management (Level 3) are presented with a disposal problem at the 'Extrashine' metal processing factory. They assume the role of the person at the factory with the responsibility for waste disposal. The assignment uses an industrially relevant case study to facilitate an objective investigation of the hazardous nature of certain waste materials and how they may safely be handled; the legal duties of waste producers, hauliers, and disposers; and what constitutes good environmental practice. Students learn the differences between acts, regulations and directives and some of the key pieces of legislation e.g. Health and Safety at Work Act (HASAWA) (1974), Environmental Protection Act (1990), COSHH (1989), Duty of Care Code of Practice, Control of Pollution (Special Waste) Act (1980).

Specific learning outcomes	Assessment criteria
4.1 Apply the principles of relevant environmental legislation (with respect to the transport of industrial waste from a producer to an authorised receiver of waste)	Outline COSHH and HASAWA Identify substances harmful to health and suggest appropriate disposal methods
4.2 Work (or identify good practice) within the principles of the relevant legislation e.g. Environmental Protection Act (1990) Water Act (1991), Health and Safety at Work Act (1974) and Control of Substances Harmful to Health Act (1989)	Suggest requirements of an appropriate waste disposer Specify procedures to protect the environment and individuals from a given industrial waste

Example 5

General learning outcome 5 — **Evaluate economic and social benefits of good environmental practice**

Student programme: Hotel & Catering Operations, Level 3, Hopwood Hall College
Assignment: Green Cuisine Day

Green Cuisine Day is an assignment undertaken by Hotel & Catering Operations students (Level 3), who evaluate the physiological and environmental impact of meals and recipes. Environmental dimensions include waste, packaging/recycling, chemicals, energy use, resource saving storage, cultivation transport, type of production. Positive and negative effects are assessed. Each student selects a recipe and prepares the dish for customer acceptance trials. They prepare a report which addresses the environmental and nutritional features of their chosen recipe, and the assessment criteria. Students select a recipe accompanied by ecological and nutritional comment. This Green Cuisine project was first carried out during the ROBI (Rochdale and Bielefeld, Germany) project in which FE students from England worked with students from Germany; the project's aim was to increase the awareness of both lecturers and students. This project was funded by a grant from the European Social Fund, which can be traced back to the International Conference at Tbilisi in 1977 and the resolution of EC Council for Ministers in May 1988, which placed special emphasis on environmental protection and sought to promote this in environmental education.

Specific learning ooutcomes	**Assessment criteria**
5.1 Relate concept of 'sustainability' to local, national and global environmental issues	List the criteria of Green Cuisine and apply to a 'product matrix'* when selecting meals Prepare a meal with reduced environmental impact
5.2 Evaluate conservation, re-use and recycling in an economic and social context	Identify one example of an environmentally friendly food in terms of personal, national and global criteria Describe the relationship between food and energy use, recycling, packaging, good production process and environmental impact

This assignment also enables the achievement of General Learning Outcome 2 (Evaluate the environmental effect of an activity)

* Use of a 'product matrix' involves students assessing the environmental impact (positive, neutral or negative) of a product, with reasons, for a range of environmentally relevant factors, e.g. energy to produce, resources used, chemicals used, type of storage, packaging, recycling arrangements, waste arrangements, transport arrangements.

Example 6

General learning outcomes 1, 2 and 5

1 State the importance of natural processes, relationships and resources that exist in the environment
2 List the environmental effects of an activity
5 Identify economic and social benefits of good environmental practice

Student programme: Carpentry & Joinery Level 2, Hopwood Hall College
Assignment: Casement Windows

'Casement Windows' is an example of the use of a practical assignment to communicate complex environmental issues. Students of Carpentry & Joinery Level 2 identify how the performance of a window can be improved by modifying its construction without increasing its cost to an uneconomic level. In doing so, heating costs can be reduced, energy conserved and unnecessary depletion of natural resources avoided.

In groups, students produce a specification for the design of an 'eco window', which takes account of drawing on manufacturers' catalogues, their experience, the types of timber and its treatment, other components, methods of fixing and sealing, and cost. They manufacture and fix the window, then test it for thermal efficiency, making comparisons with traditional construction. This has proved a successful, but time-consuming assignment.

Specific learning outcomes	**Assessment criteria**
1.1 Identify energy and timber sources	Choose and use licensed hardwood Explain the need for improved window design Describe the importance of cycles of matter and energy supply
1.2 Describe the finite nature of resources and the consequent need for management	State relationship between energy and fossil fuels and importance of improved 'U' values Explain relationships between reduced energy use and possible increase of resources
1.3 Relate the above to issues of personal, national and global consumption	Identify preferable 'U' values and methods of achieving these Link window structure to domestic energy use and global environmental problems
2.1 Describe how industrial or social processes may have an impact on the environment	Identify relationship between domestic energy use and pollution Explain how structural changes can reduce energy use and pollution

Example 6 (continued)

Specific learning outcomes	Assessment criteria
2.2 Suggest a sustainable alternative within the technology available	State ways that window structure can be altered to reduce heat loss Suggest changes to window design and carry out preferred action
2.3 Propose changes in behaviour as a result of the suggested solution	Identify structural changes to windows necessary with respect to 2.1, 2.2 Evaluate new windows based on environmental performance
5.1 State examples of local and personal activities which benefit the national and global environment	State why improved window design will improve environmental performance Assemble window structures with improved environmental performance
5.2 Describe examples of conservation, re-use and recycling	Discuss the reasons for this activity State reasons for using licensed hardwoods and need for high 'U' values Assemble window structure using sustainable resource of timber

Examples of learning assignments and assessment criteria designed to address all of the learning outcomes

The following assignments have been designed to enable, as far as possible all of the five general learning outcomes to be achieved. Assessment criteria corresponding to the general and more specific outcomes are given.

In a Business & Finance programme **An exhibition on local environmental issues**

Bromley College of Further and Higher Education has developed an assignment at Advanced Level 3 which enables all the five general learning outcomes to be addressed, and students to increase their understanding of the relationship of environmental issues with the business world.

Students in a major assignment examine either a company or industry operating locally of their choice. They consider the specific environmental issues or examine how a significant environmental issue (which may be quite a broad topic) is affecting local industry. Students consider its history, its present and possible development.

Students work in groups of about five, agree work allocation, research individual tasks, share information, and make presentations. The whole group prepares a presentation of its work for an environmental exhibition held at the college. Students document their own contribution and demonstrate how it relates to the rest of the group. Students are assessed on their understanding of the work of the group.

Assessment criteria corresponding to the general and specific learning outcomes are given. The outcomes are interpreted in the context of business activities. Students look at the relationship between a business and environmental resources, and the effect of a business and business decisions on the environment. The effect of environmental legislation and how it is enforced are examined, as are the advantages of good environmental practice.

General learning outcomes, Level 3

1 **Understand the importance of processes relationships and resources that exist in the environment**
2 **Evaluate the environmental effect of an activity**
3 **Analyse how past decisions and activities impact on a local environment**
4 **Interpret the legislative framework which exists to protect the environment**
5 **Evaluate economic and social benefits of good environmental practice**

Specific learning outcomes	Assessment criteria
1.1 Explain the importance of the cycles of matter and energy supply	Identify resources used and relation with natural ecosystems
1.2 Explain the need for management of finite resources	Describe the source and availability of resources used
1.3 Relate the above to issues of global consumption, population dynamics, and industrial and social processes	Identify and explain how the issue(s) affects the industry/firm chosen
1.4 Be aware of the interdependence of actions by individuals, communities, nations and business, and the environmental consequences and opportunities of these relationships	Identify and explain the significance of the environmental issue(s) chosen
2.1 Evaluate the impact of action based on environmental, economic, social and aesthetic dimensions	Identify and explain how the industry/firm's activities affect the (local) community and individuals
2.2 Select options and justify sustainable environmental practice	Propose solutions to the identified environmental problem(s)
2.3 Evaluate potential changes in vocational, personal and national behaviour	Identify the costs entailed in the alternative courses of action
3.1 Explain the ways in which past activities and decisions have shaped the environment of the present day	Describe and interpret the features of the local environment
3.2 Evaluate relevant historical perspectives and events	Identify how current behaviour and thinking of the industry/firm chosen has changed towards the problems identified
3.3 Identify the conflicts that arise from environmental issues and consider ways to resolve such conflicts	Interpret and evaluate the current behaviour and thinking of the industry/firm chosen, and of itself and its community to the problems identified
4.1 Apply the principles of relevant environmental legislation	Identify and explain the relevant legislation to the chosen topic
4.2 Work (or identify good practice) within the principles of the relevant legislation, e.g. Environmental Protection Act (1990) Water Act (1991)	Suggest changes in working practices to reduce environmental impact in line with the stated legislative framework
5.1 Relate the concept of sustainability to local, national and global environmental issues	Suggest changes to the existing legislation
5.2 Evaluate conservation, re-use and recycling within an economic and social context	Identify pressures for such changes and the benefits they offer

In a Leisure & Tourism course **The impact of tourism on the environment**

Students of St Helens College produce a video or a display identifying the problems created by tourism and recreational pressure on the Lancashire coast. This assignment enables each of the general learning outcomes to be addressed.

Students work as a group each with assigned roles and tasks. Students keep a record of their work and information acquired through lecturers, visiting speakers, site visits and their research, and produce individual reports. To achieve Outcome 1 requires a field visit.

Assessment criteria corresponding to the general and specific learning outcomes are given below.

General learning outcomes, Level 3

1 **Understand the importance of processes relationships and resources that exist in the environment**
2 **Evaluate the environmental effect of an activity**
3 **Analyse how past decisions and activities affect a local environment**
4 **Interpret the legislative framework which exists to protect the environment**
5 **Evaluate economic and social benefits of good environmental practice**

Specific learning outcomes	**Assessment criteria**
1.1 Explain the importance of cycles of matter and energy supply (relevant to dune formation)	Identify sand dune ecosystem and natural processes leading to its formation Describe basic sand dune ecology
1.2 Explain the need for management of finite resources	Propose examples of management strategies for conservation of wildlife
1.3 Relate the above to issues of global consumption, population dynamics and industrial and social processes	
1.4 Be aware of the interdependence of actions by individuals and communities and the environmental consequences and opportunities of these relationships	Identify activities which influence sand dune formation
2.1 Evaluate the impact of action in terms of environmental, economic, social and aesthetic dimensions	Identify natural and human affects the dune system Evaluate the impact of tourism on the coast
2.2 Select options and justify sustainable environmental practice	Identify management strategies for conservation and recreation, e.g. use of board-walks, localised pathways, specific parking/picnic areas Identify an action plan to reduce impact of tourism

(continues)

Specific learning outcomes	Assessment criteria
2.3 Evaluate potential changes in vocational, personal and national behaviour	Identify own level of commitment toward care of the environment, e.g. sustainability of individual behaviour Evaluate management strategies to deal with these
3.1 Explain the ways in which past activities and decisions have shaped the environment of the present day	State the historical background to sites (e.g. dune systems)
3.2 Evaluate relevant historical perspectives and events	Compare past and present management strategies for sites (e.g. dune systems) View and interpret sand dune sites
4.1 Apply the principles of the relevant environmental legislation	Outline EPA, HSAWA, COSHH, the Water Act, Legislation to cover SSIs and local nature reserves — National Parks and Access to Countrywide Act (1949), The Countryside Act (1969), The Wildlife and Countryside Act (1981)
4.2 Work (or identify good practice) within the principles of the relevant legislation, e.g. The Health and Safety at Work Act (1974)	Identify from the above, legislation which protects the environment State implications of legislation for conservation of the wildlife at the sites and for staff and visitors to the sites e.g. bye-laws to be displayed on site
5.1 Relate the concept of sustainability to local, national and global environmental issues	Evaluate the social and environmental cost of impact, e.g. flooding, loss of tourist revenue, loss of wildlife Propose a integrated and co-operative approach to developing solutions to environmental problems
5.2 Evaluate conservation, re-use and recycling within an economic and social context	Identify benefits of re-use of resources such as Christmas trees to trap sand

4. The way forward

The environmental outcome specifications in this report show both the feasibility and complexity of implementing environmental education throughout a wide range of curricula.

Curriculum managers responsible for developing environmental education across all or part of a colleges' provision may be faced with:

a) qualifications which already have a significant environmental dimension

and/or

b) curricula and qualifications which have no or very few intended environmental learning outcomes.

They may have some support materials of their own or from other bodies, e.g. BTEC, and now have the list of general learning outcomes for environmental responsibility proposed by the Council for Environmental Education (CEE) (see *Environmental Education Throughout Further Education 1*), and the model of general and specific learning outcomes in this report.

Where existing curricula and qualifications already have a significant environmental dimension, curriculum managers are advised to use the general and specific learning outcomes in this report, together with the CEE's list of general outcomes, as checklists against which to judge whether additional or modified outcomes and corresponding teaching and learning experiences are needed.

Where existing curricula and qualifications include few or no intended environmental learning outcomes and where there is need for new provision, curriculum managers are advised to either:

a) use the unit of outcomes in this report as a basis for implementing the curriculum, undertaking further development work where necessary

or

b) use this specification of outcomes with the general outcomes identified by the CEE project , in further development work designed to meet specific needs.

To realise environmental education throughout FE, it is important to involve as many staff as possible in the development process.

Course teams and individual teachers are advised to use the model and its application:

a) to clarify the intended environmental outcomes of their existing programmes

b) to use and further develop the illustrative assignments and assessment criteria in their existing work

c) as a stimulus to develop new assignments and clear assessment criteria in the specific vocational and general educational fields in which they work

To support the implementation and development of the ideas in this report, FEDA is interested in providing, and working with others to provide network support.

Allan Lawrence continues to develop this model involving collaboration with colleges in Germany, and a translation of the general and specific learning outcomes is available.

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ISSN 1361 - 9977